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Notice of Allowability

Application No.

10/626,732

Examiner

Aaron Piggush

Applicant(s)

NISHIDA, JUNJI

Art Unit

2838

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to response filed 3 February 2006.
2. ☒ The allowed claim(s) is/are 6-8, 11, 12, 19, 28-30, 33 and 34.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>14 February 2006</u> . 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other _____. |
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KARL EASTHOM
SUPERVISORY PATENT EXAMINER



DETAILED ACTION

Examiner's Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Rachael Leventhal on February 14, 2006. The application has been amended as follows:

SEE EXAMINER'S AMENDMENT AT ATTACHMENT (amending claims 19, 28, and 29).

Allowable Subject Matter

2. Claims 6-8, 11, 12, 19, 28-30, 33, and 34 are allowed.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Piggush whose telephone number is 571-272-5978. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Karl Easthom can be reached on 571-272-1989. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AP



KARL EASTHOM
SUPERVISORY PATENT EXAMINER

EXAMINER'S AMENDMENT

Application No. 10/626,732

Attorney Docket No.: R2180.0164/P164

REQUESTED

13-18. (Canceled)

19. (Currently Amended) A charging method for a battery, comprising the steps of:

first performing a first constant current charging by supplying a first constant current to the battery when a battery voltage of the battery is smaller than a first pre-set voltage;

second performing a second constant current charging by supplying a second constant current greater than the first constant current to the battery when the battery voltage of the battery is greater than the first pre-set voltage;
and

operating a pulse charging of the battery when the battery voltage of the battery increases to be equal to or greater than a second pre-set voltage greater than the first pre-set voltage by alternately carrying out, at intervals of a predetermined time period, a constant current charging in which the second constant current is supplied to the battery and a pausing in which the supply of the constant current charging is stopped.

wherein the operating step comprises controlling a charging current to the battery such that a charging voltage of the battery becomes substantially equal to a third constant voltage during the constant current charging of the pulse charging and such that the charging voltage of the battery becomes substantially equal to a first constant voltage smaller than the third constant voltage during the pausing of the pulse charging, and

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~~The charging method as defined in Claim 16,~~ wherein the charging current to the battery is controlled such that the charging voltage of the battery becomes substantially equal to the first constant voltage when the battery voltage of the battery is smaller than the first pre-set voltage during the first constant current charging and such that the charging voltage of the battery becomes substantially equal to a second constant voltage smaller than the third constant voltage and greater than the first constant voltage during the first constant current charging.

20-27. (Canceled)

28. (Currently Amended) A battery charging apparatus which charges a battery, comprising:

a voltage detecting circuit arranged and configured to detect a battery voltage of said battery and for outputting a signal in response to a detected battery voltage;

a current detecting circuit arranged and configured to detect a charging current supplied to said battery and for outputting a signal in response to a detected charging current;

a charging circuit arranged and configured to control said charging current such that said detected battery voltage increases to become substantially equal to a first pre-set voltage in response to an input control signal and also

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such that said detected charging current becomes substantially equal to a constant current predetermined in response to the input control signal; and

a charge control circuit that instructs said charging circuit by the input control signal to set said first pre-set voltage and said constant current in response to said signal from said voltage detecting circuit,

wherein the charge control circuit is arranged and configured to instruct the charging circuit to perform constant current charging to flow a first constant current to the battery and subsequently to flow a second constant current greater than the first constant current to the battery when the detected battery voltage of the battery is smaller than a second pre-set voltage, and to instruct the charging circuit to perform pulse charging, in which flowing current to said battery and pausing current flow to said battery are alternately performed at intervals of a pre-determined time period,

wherein the charge control circuit instructs the charging circuit to control the charging current flowing to the battery such that a charging voltage applied across said battery becomes substantially equal to a third constant voltage during the constant current charging during the pulse charging and also such that the charging voltage becomes substantially equal to a first constant voltage smaller than the third constant voltage during the pausing in the pulse charging, and

~~The battery charging apparatus as defined in Claim 25,~~ wherein the charge control circuit instructs the charging circuit to control the charging current flowing through the battery such that the charging voltage becomes substantially equal to the first constant voltage when the battery voltage is

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smaller than the first pre-set voltage which is smaller than the second pre-set voltage and also such that the charging voltage becomes substantially equal to the second constant voltage which is less than the third constant voltage and greater than the first constant voltage, during the constant current charging before the pulse charging is executed.

29. (Currently Amended) A battery charging apparatus which charges a battery, comprising:

a voltage detecting circuit arranged and configured to detect a battery voltage of said battery and for outputting a signal in response to a detected battery voltage;

a current detecting circuit arranged and configured to detect a charging current supplied to said battery and for outputting a signal in response to a detected charging current;

a charging circuit arranged and configured to control said charging current such that said detected battery voltage increases to become substantially equal to a first pre-set voltage in response to an input control signal and also such that said detected charging current becomes substantially equal to a constant current predetermined in response to the input control signal;

a charge control circuit that instructs said charging circuit by the input control signal to set said first pre-set voltage and said constant current in response to said signal from said voltage detecting circuit;

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~~The battery charging apparatus as defined in Claim 27, wherein the charging circuit further comprises:~~

a constant voltage generating circuit that generates said first, and third constant voltages;

a voltage switching circuit that selects and outputs one of the first and third constant voltages output from the constant voltage generating circuit in accordance with the control signals from the charge control circuit;

a control transistor that outputs a current to the battery in response to a control signal input to the control transistor; and

a control circuit that controls the control transistor such that the battery voltage represented by a signal output from the voltage detecting circuit becomes substantially equal to a voltage represented by a signal output from the voltage switching circuit and that the charging current represented by a signal output from the current detecting circuit becomes substantially equal to a constant current represented by a signal output from a signal switching circuit arranged and configured to supply signals to said control circuit[.].

wherein the charge control circuit is arranged and configured to instruct the charging circuit to perform constant current charging to flow a first constant current to the battery and subsequently to flow a second constant current greater than the first constant current to the battery when the detected battery voltage of the battery is smaller than a second pre-set voltage, and to instruct the charging circuit to perform pulse charging, in which flowing current to said battery and pausing current flow to said battery are alternately performed at intervals of a pre-determined time period.

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wherein the charge control circuit instructs the charging circuit to control the charging current flowing to the battery such that a charging voltage applied across said battery becomes substantially equal to a third constant voltage during the constant current charging during the pulse charging and also such that the charging voltage becomes substantially equal to a first constant voltage smaller than the third constant voltage during the pausing in the pulse charging, and

wherein the charge control circuit instructs the charging circuit to control the charging current flowing through the battery such that the charging voltage becomes substantially equal to the third constant voltage during the constant current charging before the pulse charging is executed.